

1-Types of Levers

All of the simple machines have common properties such as:

- 1- Different in shape and size.
- 2- Consist of rigid bar.
- 3- Made of different materials.
- 4- A person must inflict force on the machine to equilibrate the resistance.
- 5- There is a fixed point that each machine rotates on called fulcrum.
- 6- An effort is exerted to overcome the resistance.

The lever is: a rigid bar that rotates around a fixed point called fulcrum and is affected by force and resistance.

The importance of levers:

- A. **Increasing force:** which is the ability of converting the small exerted force to move heavy loads such as crowbar and nutcracker
- B. **Increasing distance:** allow exerting a force for a small distance to make an object move for longer distance such as the manual broom.
- C. **Increasing speed:** some levers allow the increasing of speed of an object when we inflict the lever on this object such as the hockey bat.
- D. **Moving the force from one place to another:** instead of bending to collect the garbage you can use the manual broom to move the force of the hand downward.
- E. **Avoid dangers:** for example heat, cold and poisonous materials as in the coal holder.
- F. **Accuracy in performance:** as when you use the tweezers to pick tiny objects.

2-Law of Levers

The law of force states that:

The force \times its arm = The resistance \times its arm

1 st class levers	2 nd class levers	3 rd class levers
The fulcrum is between force and resistance.	The resistance is between fulcrum and force.	The force is between fulcrum and resistance
Seesaw – crowbar – scissors.	Wheelbarrow – nutcracker – soda-water opener.	Fish hook – manual broom – sweet holder – coal holder – tweezers.
The arm of force maybe equal to or longer than or shorter than the arm of resistance.(3 possibilities)	The arm of force is always longer than the arm of resistance.	The arm of force is always shorter than the arm of resistance.

- If the arm of force = the arm of resistance then the force = the resistance.
 - The 1st class lever conserves efforts when the arm of force is longer than the arm of resistance.
 - The 1st class lever doesn't conserve efforts when the arm of force equals to or shorter than the arm of resistance.
- If the arm of force is longer than the arm of resistance then:
 - The force is smaller than the resistance.
 - The lever conserves efforts.
 - The 2nd class levers always conserve efforts because the arm of force is always longer than the arm of resistance.
- If the arm of force is smaller than the arm of resistance then:
 - The force is bigger than the resistance.
 - The lever doesn't conserve efforts.
 - The 3rd class levers don't conserve efforts because the arm of force is always shorter than the arm of resistance.

Justify the following(give reasons) :-

1) The wheel barrow is a second class lever.

Because the resistance is between the force of effort and the fulcrum

2) Levers perform tasks more easily. OR (some of levers are important although they don't conserve the effort)

Because they:

- a. Increase force.
- b. Increase distance.
- c. Increase speed.
- d. Move the force from one point to another.
- e. Help us to avoid danger.
- f. Help us perform accuracy.

3) The fish hock doesn't conserve efforts while the nutcracker conserves efforts.

Because it is a third class lever in which resistance arm is longer than the force arm so effort force will be more than the resistance force. But nutcracker is a 2nd class levers .so the force arm is longer than the resistance arm so, effort force will be less than the resistance force.

4) The 3rd order levers don't conserve efforts.

Because it is a third class lever in which resistance arm is longer than the force arm so effort force will be more than the resistance force.

5) In the second class levers the force is always less than the resistance.

Because force arm is always longer than the resistance arm so effort force will be less than the resistance force.

6) Sometimes the 1st class levers save efforts.

Because may the force arm be longer than the resistance arm so it may conserves the effort

7) The broom is a 3rd class lever while the nutcracker is 2nd class lever.

Because the broom has the force between resistance and the fulcrum,
While the nutcracker has the resistance between the force of effort and the fulcrum

8) The see-saw is a 1st class lever while the soda water opener is a 2nd class lever.

Because in see-saw the fulcrum is between the force and resistance. While the soda opener has the resistance between the fulcrum and the force.

9) We use the manual broom in our homes.

Because it helps us in: -

1- Move the force from one point to another.

2- Increase distance.

10) The crowbar and the nutcracker are useful levers.

Because the crowbar and the nutcracker help us in increasing force

11) The hockey bat is considered a useful lever.

Because it increases the speed

12) The coal holders and ice holders are useful levers.

Because it helps us to avoid the danger

13) The 3rd class levers don't conserve efforts

Because the arm of force is always shorter than the arm of resistance.

So the effort force will be longer than the resistance

Problem:-

Habiba's weight is 250 Newton; she sat on a seesaw at 3 m from the fulcrum. Where Farida should sit to balance the seesaw if her weight is 150 Newton?

By applying the law of levers :-

Force x it's arm = Resistance x it's arm

$250 \times 3 = 150 \times \text{it's arm}$

The resistance arm = 5 m

You have to write the law of levers before the answer

The electric lamps

- The Sun is the main source of light on Earth.

The electric lamp:

- A tool that converts the electric energy into light energy.
- A constant source of light that is clear, bright, smoke odor free and vapor odor free.
- There are several types of electric lamps.
- The most popular types of electric lamps are: the light bulb – the fluorescent lamp.

The electric current: is a flow of electric negative charges (electrons) that flows through a material that conducts electricity.

First: the light bulb:

Consists of three main parts:

The filament:

- A thin coiled wire which is made of tungsten.
- The electricity flows through the filament by connecting wires of copper and lead that connect the base of the lamp to the filament.
- The filament is made of tungsten because:
 - The tungsten filament glows when electricity passes through.
 - The tungsten has a high melting point that protects the filament from melting in high temperature.

The glass bulb:

- Filled with inert gas such as Argon.
- The inert gas increases the life of the filament by preventing the combustion of the filament.

The base of the light bulb:

- Carries the lamp upright.
- Connect the lamp with the electric circuit.
- There are two types of lamp bases:
 - The spiral which has a piece of lead for connection.
 - The nail light bulb which has two side nails and two inside pieces of lead for connection.



Two nails and
two pieces of
lead



Spiral

Second: The fluorescent lamp:

Consists of main three parts:

Glass tube:

- Vacuumed and contains inert Argon gas and a little amount of Mercury.
- The inner surface of the tube is covered with phosphoric material.

Two filament of tungsten:

- Exist at the tips of the lamp from the inside.

Points of connection:

- Two points of connection at each tip of the lamp.
- The connection points are for connecting the lamp with electricity.

The simple electric circuit:

- Consists of: battery (source of light) – electric wires – lamp.
- In order for the electricity to pass through the circuit must be closed (all parts of the circuit must be connected together).
- If the circuit is open (not all the parts of the electric circuit is connected) the electricity will not pass through.

Connecting lamps:

Connecting in series	Connecting in parallel
- The electric bulbs are connected one after another.	- The electric bulbs are connected in branching routes.
- The electric current has one route to pass through; therefore when one lamp is burned or unscrewed the lamps are turned off.	- The electric current has more than one route to pass through; therefore when one lamp is burned or unscrewed the other lamps continue to work.
- When we connect more than one bulb in series the lighting of the bulbs decrease until it weakens.	- When we connect more than one bulb in parallel the lighting remains the same (doesn't change).

Connecting the electric lamps in houses:

- Lamps in houses are connected in parallel, so when one lamp is burned or unscrewed the other lamps continue to work.
- The lamps in the house are connected to the main distributor of the energy but they function independently.

Dangers of electricity and how to deal with it

Materials are divided into two types regarding its conductivity:

- 1- **Conductors**: materials which allow electricity to pass through such as metals (iron – copper – aluminum – gold – silver).
- 2- **Insulators**: materials that don't allow electricity to pass through such as (rubber – glass – wood – wool).

Life applications:

- Electricity reaches our houses from electric power stations.
- The electric current is transmitted through metal cables.
- The metal cables are hanging through long insulating materials which prevent the electric current from transferring to the towering poles.

Dangers of electricity:

- 1- Electric fires.
- 2- Electric shock.
- 3- Electric burns.

There are two types of injuries:

- a. Direct injuries: electric fires – electric shock – electric burns.
- b. Indirect injuries: falling from a high place when touching naked electric wire with electricity passing through.

First: the electric fires:

Reasons of electric fires:

- 1- Items like (furniture – carpets – rugs – clothes) are near electric machines that generate heat.
- 2- Increasing the electric load by operating more than one machine in one socket.
- 3- Not disconnecting electric machines that generate heat after use which leads to the increase of temperature that causes fire.

The difference between the regular fire and the fire caused by electricity:

- In regular fire you can use water to put it off.
- In electric fires we can't use water because water is a good conductor.

The electric shock:

- Is the result of an electric current passing through the human body.

The harms caused by the electric shock:

Depends on:

- a. The strength of the electric current passing in the human body.
- b. The time it takes the electric current to pass through the human body.

In many cases the electric current can cause death.

When the electric shock occurs?

When the human body is part of a closed electric circuit. How?

- 1- Part of the body touches a wire that has electric current and touches the ground with another part.
- 2- You touch with one part of your body a wire that has an electric current and touching a material that conducts electricity and connected to the ground.
- 3- You touch two wires conducting electricity.

The burns resulting from the electric current:

How electric burns occur?

- 1- The body touches directly an electric current source. Electric shock occurs as well.
- 2- Touching fire or the spark resulting from an electric fire.
- 3- Touching an electric machine that generates heat.

First aids when accidents occur as a result of the electric current:

- A. The injured must be insulated from the electric current by:
 - a. Disconnecting electricity.
 - b. Bushing the injured away by using an insulating material.
- B. Call the physician to the accident location.
- C. If the injured is breathing you must facilitate his breathing by opening the tight clothes.
- D. You must maintain the heart beats massaging with the palms of your hands.
- E. If the injured can't breathe, start artificial respiration.

Precautions in dealing with electricity:

- 1- Do not place several connections in the same socket.
- 2- Do not insert a metal object in the socket (nail, screw driver not insulated, metal wire).
- 3- Place a piece of plastic in the socket to prevent inserting another body in it.
- 4- Do not touch the electric machines that are connected to the electrical current with a wet hand.
- 5- Do not leave an electric machine or heater connected with the electrical current while taking a bath.
- 6- Do not play with the electric connections.
- 7- Do not try to fix, maintain or clean any electric machine while connected with the electric current.
- 8- Do not place the flammable materials (curtains, furniture, clothes, covers, rugs, paper) near the electric machines that emit heat (the iron, the electric heater, the lamp, the heater).
- 9- Do not leave the wires naked and not insulated.
- 10- Do not place the electric wires extending on the ground **so no one trips on them while walking.**

Give reasons for:-

1. The light bulbs are the most popular source of artificial light.

Because it is used in lighting houses, car lights and torches.

2. The filament of the light bulb is made of tungsten.

a- Because it has high melting point that prevents the melting of the filament at high temperatures.

b- to glow and emit the light

3- The glass bulb in the light bulb is filled with inert argon gas.

To protect the filament from burning and increase the lifetime of the filament.

4- The glass bulb of the electric lamp is made of thin glass containing inert gas.

To prevent air from reaching the filament to protect it from burning.

5- There is a glass bulb around the parts of the electric lamp.

To prevent air from reaching the 'filament to protect it from burning.

6- The filament of the electric lamp is the most important part in the light bulb.

Because it heats up and emits light when the electric current passes through it.

7- There are pieces of lead in the base of the light bulb.

To connect the lamp to the electric circuit.

8- Copper and lead wires are connected with the filament from one end and connected with the base of the bulb from the other end.

To transfer the electric current from the base of the lamp to the tungsten filament.

9. The fluorescent lamps are very important in our life.

Because they are used in many purposes as:

- Lighting houses, offices

- Decorating commercial stores.

10. The glass tube of the fluorescent lamp is filled with argon gas.

To protect the two filaments of tungsten from burning and to increase their lifetime.

11. There are two points of connection at each tip of the fluorescent lamp.

To connect the fluorescent lamp to the electricity.

12. The light bulbs are connected in the house in parallel.

To prevent turning off all the lamps of the house when one lamp is damaged or turned off.

13. In the decorative lights, if one or more lamps burn out, the other lamps don't turn off

Because the lamps of the decorative lights are connected in parallel.

14. Decorative lamps are connected in parallel not in series.

To prevent turning off all the lamps when one or more lamps burn out.

15. Electric energy is very necessary in our daily life.

Because we use it:

- To cook food and preserve it.

- To light our houses, factories,

- In operating some machines as washing machines, radios and televisions.

16. The electric wires are made of copper.

Because copper is a good conductor of electricity.

17. The electric cables (wires) are covered by insulating materials.

To avoid occurrence of electric shock when touching the electric wires (cables).

18. Aluminum is an electric conductor:

Because it allows electric current to pass through it.

19. Plastic is considered as an electric insulator.

Because it doesn't allow electric current to pass through it.

20. Not placing flammable materials close to the electric machines that generate heat.

The electric heater must not be placed close to furniture or rugs. To avoid occurrence of electric fires.

21. Plugging more than one machine to one socket causes electric fires.

Because it causes electric overload that heats up wires leading to fires.

22. We must disconnect the electric current from the electric machines that generate heat after use.

Because this causes an increase in the temperature of these machines that leads to fires. and it may causes skin burns.

23. Water is not used to put out electric fires.

Because water is a good conductor of electricity, so it increases fires and could harm the rescuers.

24. If we insert an iron nail in an electric circuit, the electric current will pass through it.

Because iron is an electric conductor.

25. If we insert a piece of wood in an electric circuit, the electric current will not pass through it.

Because wood is an electric insulator.

26. Don't place any metallic object in the socket.

To avoid occurrence of electric shock.

27. Placing a piece of plastic in the socket.

To avoid playing children in electricity that causes many dangers. Like electric shock

28. Pushing the injured by anything that is non-conducting of electricity such as a piece of wood.

Because the electric insulating material such as wood will prevent the transfer of electricity from the injured person to your body.

29. We must not touch any electric machine with wet hand.

To avoid occurrence of electric shock as water is a good conductor of electricity.

30. Avoid fixing or maintain any electric machine, while it is connected to the electric source.

To avoid occurrence many dangers as electric shock.

What happens if

1. There is no glass bulb around the parts of the electric lamp.

The air will reach the filament causing its burning when it heats up.

2. The glass bulb in the electric lamp is filled with air

The filament will burn when it heats up.due to the combination with oxygen

3. You make the filament of the light bulb from iron.

It will not emit the light and the filament will melt at the high temperatures.

4. The tungsten filament in the light bulb is cut.

The light bulb will not emit light.

5. There is no battery in the electric circuit.

There is no electric current in this circuit as the battery is the main source of the electric current.

6. Many light bulbs are connected in series in an electric circuit.

The light intensity of the lamps will decrease by increasing the number of the connected light bulbs. and if one lamp turned off or broken down all the lamp will turn off.

7. Many light bulbs are connected in parallel in an electric circuit.

The light intensity of the lamps will not be affected (constant) by increasing the number of the connected light bulbs.

8. One of the electric lamps burns out while it is connected in series with the others.

Turning off one light bulb in an electric circuit that contains many lamps connected in series.

The other lamps in the electric circuit will be turned off.

9. One of the electric lamps burns out, while it is connected in parallel with the others

The other lamps in the electric circuit will not be affected and keep lighting.

10.The light bulbs in the house are connected in series.

When one of the lamps damaged or turned off, all the other lamps in the house will turn off.

11.The electric current passes through the tungsten filament in the light bulb.

The tungsten filament heats up and emits light.

12. The bulb of the electric lamp is filled with oxygen.

The tungsten filament will burn when it heats up.

13. You place the electric heater too close to furniture or carpets.

When the temperature of the heater increases, it may burn the furniture or carpets causing fires.

14.You place the electric iron too close to furniture or rugs.

The electric fires may occurs.

15. Plugging several electric machines in the same electric socket.

It causes electric overload, so the wires heat up causing electric fires.

16. A piece of copper is inserted in a closed electric circuit.

The electric current will flow through the circuit as copper is a good conductor of electricity.

17. A piece of glass is inserted in a closed electric circuit.

The electric current doesn't flow through the electric circuit, because glass is a bad conductor of electricity.

18. A man touches uncovered wire that has an electric current.

The electric shock may occur.

19. You insert a metallic bar in an electric socket.

This causes an electric shock. because metals are good conductors of electricity

20. You try to fix or maintain an electric machine, while it is switched on.

This may causes an electric shock.

21. The electric fires are put out by water:

The fire will increase and could harm the rescuers as water is a good conductor of electricity.

22. Touching a naked wire, while touching the ground.

This may cause an electric shock.

23. The spark resulting from the electric fires touches any part of your body

This may cause electric burns for you.

24. The electric wires are left uncovered and non insulated.

This causes an electric shock when touching the uncovered wires.

25. Electricity is not handled cautiously.

Electricity may cause many dangers as electric fires, electric burns and electric shock.

The solar eclipse

The solar eclipse:

- A natural phenomenon in which the Sun disappears completely or partially.
- The solar eclipse happens when the Moon, Earth and the Sun in straight line with the Moon in the middle.
- The solar eclipse is reputedly happening due to the rotation of the Moon around the Earth.

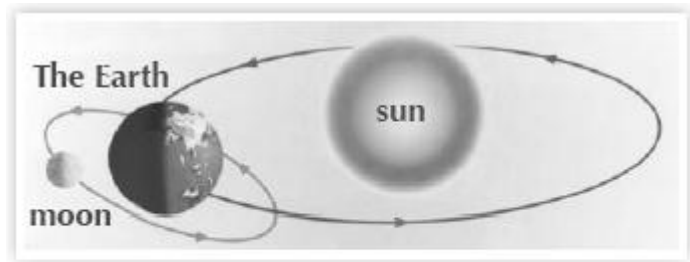
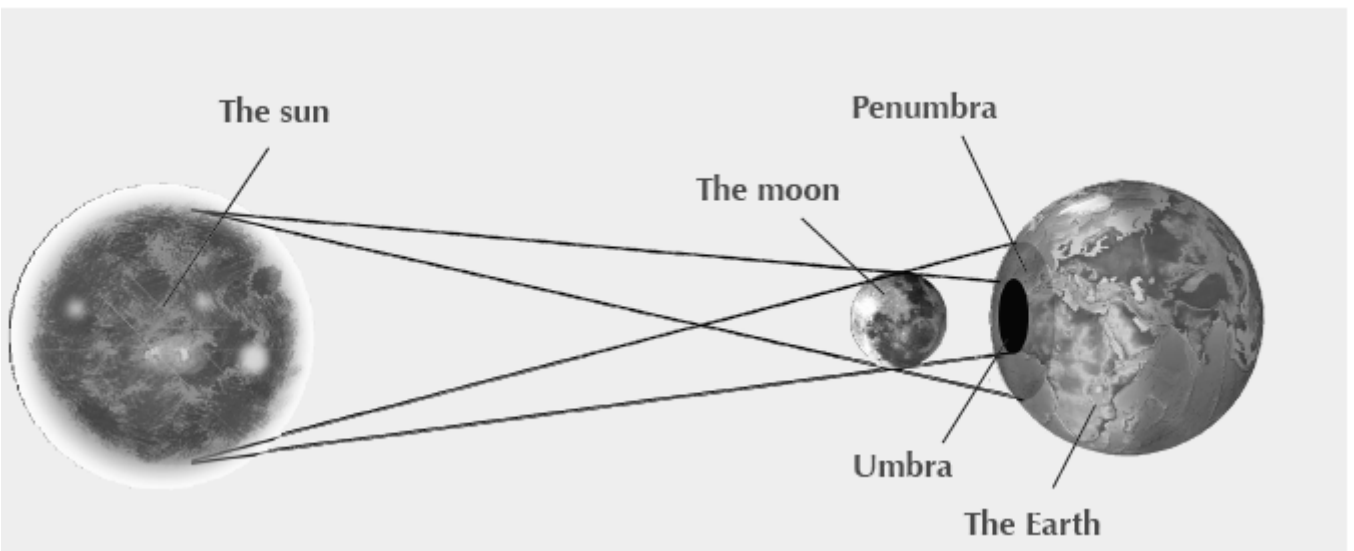


Fig (3-1): *The moon revolves around Earth and they both revolve around the sun.*



There are three types of solar eclipse:

Total solar eclipse	Partial solar eclipse	Annular solar eclipse
Is formed in the shadow area of the Moon in which we can't see the Sun completely.(a 250 km radius)	When we live in the semi-shaded area of the Moon on Earth we can see part of the Sun only.	When the Moon is in higher orbit from Earth and the cone of shadow doesn't reach the Earth

Safety precautions on observing the solar system:

Special glasses must be used when observing the solar system. **Why?**

- 1- The outer solar corona keeps on emitting harmful rays such as the ultraviolet and infrared.
- 2- The harmful rays affect the eyes in general or the retina and can lead to blindness within few minutes.

The lunar eclipse

The lunar eclipse:

- 1- A natural phenomenon in which the Moon disappears completely or partially.
- 2- The phenomenon occurs when the Moon, Earth and the Sun are in straight line with Earth in the middle.
- 3- The lunar eclipse happens twice a year.

Types of lunar eclipse:

1-Total lunar eclipse	2-Partial lunar eclipse
The whole moon enters the shadow area of the earth.	Part of the Moon enters the shadow area of the earth

3- Semi shaded lunar eclipse

When the whole moon enters the penumbra area

Note the following:

- 1- At the start of the total lunar eclipse the color of the Moon tends to be red due to the red ray that can't be absorbed by the atmosphere of the Earth.
- 2- When the whole Moon is in the semi shadow area of Earth, the Moon light turns to be faint without being an eclipse.
- 3- The lunar eclipse occurs during the night and in the middle of the lunar month.(Full moon)

Comparison between solar and lunar eclipse:

Solar eclipse	Lunar eclipse
Happens when the Moon comes between the Earth and the Sun.	Happens when the Earth comes between the Moon and the sun.
Happens only during day light.	Can be seen from any place on Earth when the Sun is behind the horizon at night.
Requires precautions to protect the eyes from the UV and infrared radiations emitted by the Sun.	Doesn't require precautions because the solar eclipse doesn't any harm to the eyes.
The duration of the solar eclipse doesn't exceed 7 minutes and few seconds.	The duration of the lunar eclipse may last for more than two hours.
Both phenomena represent astronomical phenomena that happen due to the rotation of the Moon around the Sun.	

LESSON THREE

Observing the space

Space monitoring in ancient ages:-

Babylonians: discovered that the moon returns back to the same point where the lunar or solar eclipses occurred after 18 years and 11 days.

Arab scientists: established astronomical observatories on high places like mountains to monitor the movement of planets and stars. They made equipment to monitor the path of the sun, the moon and planets as well as assign the stars' locations and study their states.

Al-Hassan Ibn El-Haitham: proved that vision occurs due to the amount of light reflected or emitted from objects on the eye.

The telescope: is a device that is used to see distant objects clearly.

Uses of telescope:

1. To see objects on the Earth's surface.
2. To see celestial objects like the stars and planets (astronomical telescope).



Idea of working telescope:-

The idea of inventing a device that collects the greater amount of light emitted from the distant stars or reflected from the planets in the universe.

The scientist Galileo is the first one who made an astronomical telescope in 1609 that depend on magnified photos by using lenses.

Observatories:

Places where astronomers work and where telescopes are kept.

Their ceilings are domes to be opened at night to expose and direct the telescope towards any part of the space.

Observing space outside the earth:-

Man has recently placed telescopes revolving around the Earth outside the Earth's atmosphere.

Hubble telescope:

Revolves around the Earth in an orbit of 600 km higher than the surface of the sea.

This telescope was launched in a space shuttle in 1990 after ten years of design and building it.

Its length reaches 16 meters.

It collects light by using mirrors.

Sputnik satellite:

It is the first satellite that lunched in an orbit around the Earth.
It had been lunched in 1957.

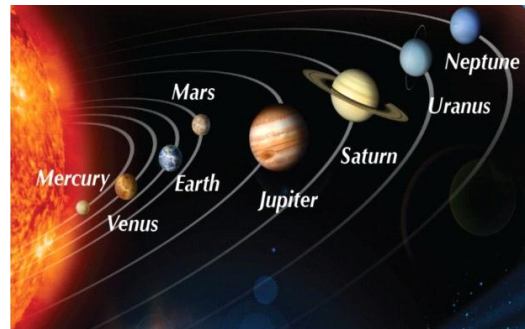
Galaxies:-

They are groups of millions of stars forming beams of light in the middle of the space.
Galaxies have different shapes.



Milky Way galaxy:-

It has a spiral shape and four arms.
It contains more than two hundred billion stars and group systems.
It includes our solar system to which our planet Earth belongs.



Solar system:-

The position of the solar system on one of the Milky Way's arms.
The sun and the solar system's planets and moons are the nearest objects to see in the sky.

Types of planets:-

- a- Small rock planets: this group includes (Mercury – Venus – Earth – Mars).
- b- Huge gaseous planets: this group includes (Jupiter – Saturn – Uranus –Neptune).

Give reasons

1- The moon blocks sunlight from reaching the Earth when it comes between the sun and the Earth.

Because the moon is a dark body that doesn't allow the sunlight to pass through

2. The distance between the moon and the Earth varies during the moon's rotation around the Earth.

Because the moon rotates around the Earth in an oval shape orbit.

3. The type of the solar eclipse differs according to the movement of the moon in front of the sun.

Due to the difference in the part of the sun that the moon hides during its passage in front of the sun

4. The total solar eclipse is formed when the moon rotates nearer to the Earth.

Because when the moon rotates nearer to the Earth its size appears equal to the sun. So, it hides all the sunlight.

5. The annular solar eclipse occurs when the moon comes in an orbit higher to the Earth.

Because the moon size appears smaller to the sun, so, the sun appears as a lighted ring

6. The total solar eclipse appears at umbra.

Because the umbra is the dark inner shadow of the moon in which no sunlight appears.

7. The partial solar eclipse appears at penumbra.

Because the penumbra is the faint outer shadow of the moon in which a part of the sunlight is hidden.

8. We shouldn't look directly to the sun with naked eye.

Because the sun emits harmful rays to eye such as ultraviolet rays and infrared rays that may cause blindness within few minutes.

9. The use of special glasses to look at the solar eclipse.

To protect our eyes from ultraviolet and infrared rays coming from the sun that may cause blindness

10. Scientists can mention the times and the locations where solar eclipse occurs.

Because it is possible to predict the times of the rotation of the moon and the Earth in their orbits around the sun.

11. We can't see the sun completely during the total solar eclipse.

Because the moon hides all the sunlight from the Earth as the moon size seems nearly equal to that of the sun.

12. The lunar eclipse occurs in the middle of the lunar month: (full moon).

Because in the middle of the lunar month the Earth lies between the sun and the moon.

13. The lunar eclipse doesn't require precautions or special devices to observe it.

Because it doesn't harm the eye during observing it.

14. The umbra shadow of the Earth causes two types of lunar eclipse.

Because when a part of the moon enters the umbra shadow, it causes partial lunar eclipse while when the whole moon enters the umbra shadow, it causes total lunar eclipse.

15- The moon is colored in red at the start of the total lunar eclipse.

Due to the refraction of some red rays that are not absorbed by the Earth's atmosphere.

16. No annular lunar eclipse is formed like the annular solar eclipse.

Because the Earth has a great size relative to the moon, so it always blocks all sunlight when it comes between the sun and the moon on the same straight line.

17. Lunar eclipse can be seen easily from the Earth's surface.

Because the lunar eclipse may last for one or two hours and doesn't require precautions or special devices to observe it.

18. The effect of the lunar eclipse on eye differs from that of the solar eclipse.

Because the lunar eclipse doesn't cause any harm to the eye, but the solar eclipse causes serious harms to the eye.

19. The phenomena of solar and lunar eclipses are considered applications of the umbra phenomenon.

Because the light of the sun passes in straight lines and if a dark object as the moon or the Earth obstruct it, a shadow is formed.

20. The two phenomena of lunar and solar eclipses are repeated regularly and can be predicted.

Because they occur as a result of the Earth and the moon rotation which can be calculated.

24- Since the past, man was concerned with observing stars and planets.

To find a suitable reason for the astronomical phenomena that they observed in the sky

25- In the past, exploring the Arab month's crescent was through climbing on top of mountains and minarets.

To determine the start of the holy month of Ramadan (the moon's crescent) through a clear atmosphere

26- Placing telescopes in space rather than on the earth's surface is recommended.

To obtain a clear vision for the space and monitoring it accurately and to study stars and galaxies from their location

What happens when?

1. An object is put between a light source and a screen.

It casts its shadow on the screen.

2. The Earth, the moon and the Sun are nearly on one straight line with the moon is in the middle.

The solar eclipse occurs.

3. The solar eclipse is watched from umbra region.

It appears as total solar eclipse.

4. The solar eclipse is watched from penumbra region.

It appears as a partial solar eclipse.

5. The solar eclipse is watched from the antumbra region.

It appears as an annular solar eclipse.

6. The size of moon appears smaller than that of the sun during the solar eclipse.

The solar eclipse appears as annular solar eclipse.

7. The moon hide a part of the sun from the Earth's surface.

A partial solar eclipse occurs.

8. You focus looking to the sun directly during the solar eclipse

The eye retina will be harmed and blindness may occur.

9. You use a special glasses during observing the solar eclipse.

We can watch the solar eclipse safely.

10. The Earth comes between the sun and the moon.

The lunar eclipse occurs.

11. The Earth prevents some sunlight from reaching the moon's surface.

Partial lunar eclipse or semi-shaded lunar eclipse occurs.

12. The Earth blocks the sunlight from reaching the whole moon.

Total lunar eclipse occurs.

13. The moon completely enters the semi-shaded area.

The moon light turns to be faint without being eclipse

14. The whole moon enters the Earth's umbra.

Total lunar eclipse occurs.

15. A part of the moon enters the shadow area of the Earth.

Partial lunar eclipse occurs.

16- Putting astronomical telescope in tunnels .

We can't obtain a clear vision for the celestial bodies

17- satellite are not provided with cameras and telescope

We can't study stars in space and we can't see photos for them

Definitions

1. The solar eclipse phenomenon:

It is the astronomical phenomenon which occurs when the Earth, the moon and the sun are nearly on one straight line with the moon in the middle.

2. The cone umbra (umbra):

It is the dark inner shadow in which the total solar eclipse appears.

3. The penumbra:

It is the faint outer shadow in which the partial solar eclipse appears.

4. Total solar eclipse:

It is the type of solar eclipse in which we can't see the sun completely and it is formed in the shadow area (umbra) of the moon.

5. Partial solar eclipse:

It is the type of solar eclipse in which we can see a part of the sun and it is formed in the semi-shaded area (penumbra) of the moon.

6. Annular solar eclipse:

It is the type of solar eclipse in which the sun appears as a lighting ring and it is formed when the moon is a higher orbit from the Earth.

7. Lunar eclipse:

It is the astronomical phenomenon which occurs when the sun, Earth and the moon are nearly on one straight line with the Earth in the middle, hiding the sunlight from the moon.

8. Total lunar eclipse:

It is the lunar eclipse which occurs when the whole moon enters the shadow area (umbra) of the Earth.

9. Partial lunar eclipse:

It is the lunar eclipse which occurs when a part of the moon enters the shadow area (umbra) of the Earth.

10- Observatories:

Places where astronomers work and where telescopes are kept.

Their ceilings are domes to be opened at night to expose and direct the telescope

11- Galaxies:-

They are groups of millions of stars forming beams of light in the middle of the space.

Galaxies have different shapes

12- Solar system:-

The position of the solar system on one of the Milky Way's arms.

13- telescope:-

It is device that is used to form magnified photos for distant objects such as celestial bodies

ABSORPTION AND TRANSMISSION OF WATER AND MINERAL SALTS IN PLANTS

Green plants depend on simple raw materials to make their own food by
photosynthesis process

✓ **The needed conditions for plants to make
photosynthesis:**

1-Carbon dioxide gas from air

2-Sunlight from sun

3-Water and mineral salts from the soil

The material	The source
Carbon dioxide gas	- From the air.
Water and mineral salts	- From the soil. - Absorbed through the root hairs that present in their roots
Light	- From the sun. - Absorbed by chlorophyll.
Other elements	- Needed by very little amount like: Phosphorus, Magnesium, Calcium. Nitrogen, Zinc and Other elements.

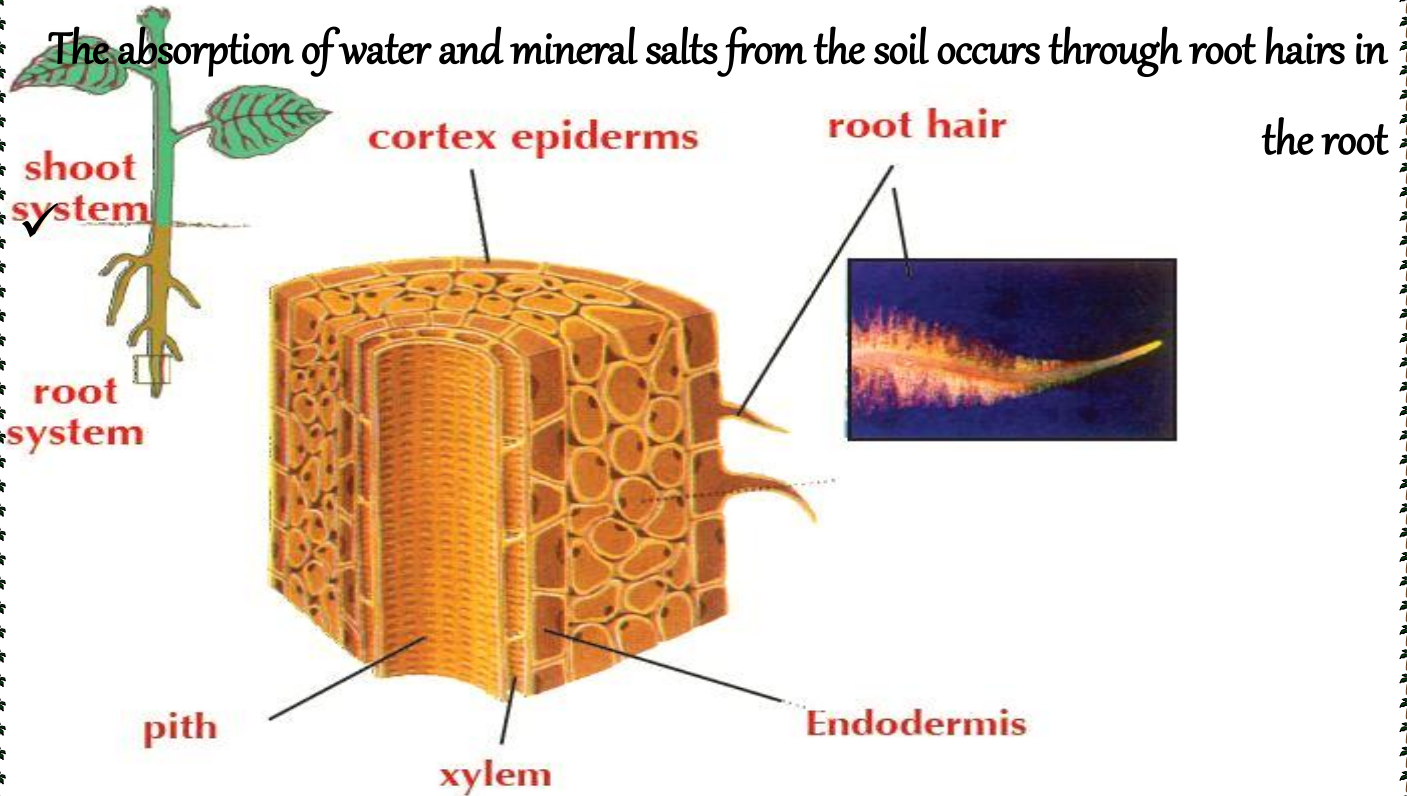
✓

✓

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✓ The structure of the plant root:

It consists of: epidermis - endodermis – cortex – xylem – pith



The layer	The importance
Epidermis layer	- It is the external layer.
Cortex layer:	- The last row of cells in cortex layer is called endodermis (Regulates passing of water to xylem.)
Xylem (wood) layer	It follows the cortex layer. It raises the juice to reach the stem and other parts.
Pith layer :	- It is the last layer that follows the xylem layer.

✓ The role of the root system:

- 1-Fixing the plant in the soil
- 2-Absorb water and salts from the soil and raise it to the shoot system

✓ Root hairs

They are extended from the root and lined from inside with cytoplasm and have a big vacuole

- ✓ The age of the root capillary doesn't exceed a few days GR

Because the epidermal cells are lost from time to time by the resistance of soil particles during the expansion of the root

✓ The role of the root hairs in absorption of water and mineral salts

- 1- It has a thin membrane that allows the penetration of water and salts through it
- 2-It has a large number to increase the surface area absorption
- 3-The concentration of the solution in the vacuole is larger than the concentration of soil solution which helps in the transmission of the water from the soil to the root hair by osmosis feature
- 4-Root hair secretes a sticky substance that helps in root penetration through the soil so it draws water to work as a water membrane that helps in absorption process

A semi-permeable membrane	- Has selective permeability property which allows only some salts to pass through according to the plant's need.
Extend from the root.	- extend from epidermis layer.
Thin layer of cytoplasm	- Lined from inside.
Big vacuoles	- That contain large amount of salt solution.

The age of the root hairs does not exceed a few days. (G.R.)

- because the skin (epidermis) cells slough from time to time by the resistance of soil particles during extending of the root.

The role of root hairs and their appropriateness (suitability) for absorption of water and mineral salts:

1- They have thin membranes. (G.R)

To allows the penetration of water and salts through them.

2- They have a large number (G.R)

To increase the surface area for absorption of water and salts from the soil.

3- They secrete a sticky substance. (G.R)

That helps the root to penetrate through soil particles

4- The concentration of the salt solution inside their vacuoles is higher than the concentration of the salt solution in the soil. (G.R)

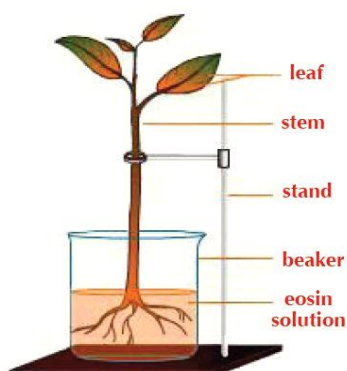
To help in water transport from soil to inside the root by osmosis.

High concentration of salts	Low concentration of salts.
It contains a small amount of water. It has low concentration of water.	It contains a large amount of water. It has high concentration of water.

✓ Activity to show the rise of juice from the root to other parts of the plant

Put a small flowered plant in a small cup contain eosin solution for several hours.

Observation: The color of the leaf petioles, roots, leaves, and flowers turn red



- Root hairs in epidermis of the root absorbs water from the soil GR?

Because the salt concentration in the vacuole is larger than salt concentration in the soil.

Water flows from the soil into the root hair through its semi-permable membrane by osmosis then it moves through root cells which contain composition of cells called endodermis which regulates water crossing into a tissue called xylem where the juice is raised to the stem and other parts of the plants.

* As for mineral salts, the cell membrane has the osmotic property. It allows only some salts to pass through according to the plant's needs. This process needs energy that it obtains from respiration process

✓ Activity to show the transpiration process

Cover a green plant with a Vaseline layer and put it under a bell jar for several hours



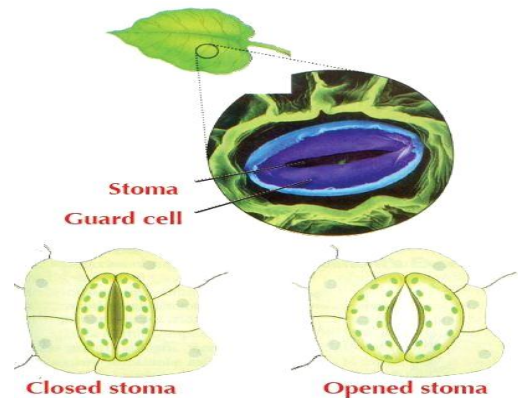
Observation: drops of water are formed in the inner walls of the bell

Conclusion: plant loses water by transpiration process

- The condensation of water droplets on the inner surface is due to the vital process which is transpiration

❖ Transpiration process:

Losing of water in the form of water vapor from leaves or green parts through holes in the plant leaves called stomata



❖ Stomata:

Small holes on the plant leave where water loses through them

- The number of stomata on the lower surface of plant leaf is greater than the upper surface
- Each stoma is surrounded by two guard cells to open or close the stoma
- The plant loses some of its water through holes in the plant leaves called stomata in process called transpiration.
- When the plant loses, this creates a pulling force that rises water to the top. **This force due to transpiration**

☒ **The function of tow guard cells**

- They change their shapes **to control opening and closing the stoma.**

☒ **Importance of transpiration:**

When the plant loses water, this creates pressure (a pulling force) that raises water to the top.